Waterway Information Network (WIN)

PRINCIPAL INVESTIGATOR:

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PROJECT DESCRIPTION:

The basic concept of the Waterways Information Network (WIN) is to create a peer-to-peer network to facilitate distribution of marine transportation system information. It would be based upon widespread Internet technology. The system will allow users to connect directly to information providers, such as, government agencies, port authorities, marine exchanges, and other private companies that comprise the MTS. There is no concern about information being lost or changed in any translation or change of custody. The network would be comprised of government agencies and private industry that would be both users and providers of information.

The first step in the development of this network is the creation of the language that facilitates automated exchange of communications between maritime information providers and users. Industry developments have provided us with Extensible Markup Language (XML), an Internet data transfer technology that identifies data to be exchanged in a structured form and can be read by any Internet browser. Many industries are developing tailored versions of XML that standardize the types of data they wish to exchange. For WIN it is important to involve the various maritime information providers in the creation of this tailored XML, we call the Maritime Information Markup Language (MIML). Each provider of information will be recruited to join this effort and help in developing the data structure and data dictionaries parts of the MIML that would pass their data. MIML would be the key development toward an automate maritime information infrastructure and allow creation of a seamless network of providers and consumers of maritime information.

Develop an effective Internet based information infrastructure to support navigation safety and marine safety missions of the Coast Guard. The technical approach is based on developing an XML definition (Maritime Information Markup Language - MIML) that is a standard format for information exchange. The project is also developing a peer-to-peer protocol that utilizes the MIML to quickly and efficiently shares information in an automated fashion.

PROGRESS TO DATE: Currently Arizona State University is working with the Coast Guard R&D Center on the integration of maritime information from multiple sources including Digital Nautical Charts, the Coast Pilot, and real-time data from various websites using in MIML for Web-based passage planning for coastal voyages.

Information on ASU's research is available at:
http://www.eas.asu.edu/~gcss/research/navigation/.

We are currently seeking industry and government for input on the development of a Waterway Information Network using Maritime Information Markup Language as the language for exchanging information.

FUTURE PLANS: The WIN project has just begun. We are currently planning a series of workshops to begin the development of the MIML.

PRODUCTS: An effective infrastructure for exchanging information has been identified as a major performance gap within the Coast Guard and industry. WIN will fill this gap and enable other solutions to be built on top of it.

Intelligent Waterway Systems (IWS)

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PROJECT DESCRIPTION: The Coast Guard R&D program has identified Intelligent Waterways Systems (IWS) as an investment area. The R&D program intends to commit R&D resources to help fill CG performance gaps in this area. We have analyzed many CG business and strategic plans to help find the opportunities for the development of IWS products. A recurring theme has been the need for better information exchange.

PROGRESS TO DATE: We have analyzed Coast Guard performance gaps and have established R&D product lines to frame our project selection and resource decisions. Several projects are underway and three more have begun under IWS. Consideration of the entire investment area has made it easier to exploit the interactions and synergies between the projects. The value of individual projects that are seen as an important piece of the whole IWS vision is substantially greater.

FUTURE PLANS: We will continue to look for high return opportunities in Intelligent Waterways and try to develop products to address them.

PRODUCTS: The following interrelated projects are part of the IWS investment area:

AidMix AtoN User Survey - Description of results of AtoN User survey

AIS Demonstration project - status update on the AIS standards and SFBay demonstration project

Buoy Information Network - development of information on the potential business impact of instrumenting selected AtoN to support condition based maintenance. (new project)

Next GENeration NAVaid Research – examination of the possible future of aids to navigation.

Waterway Information Network - Internet protocols and Marine Information Markup Language development

Linking Risk Assessment of Marine Operations to Safety Management in Ports

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PROJECT DESCRIPTION

Problem Statement

As a consequence of the Sea Empress disaster in Milford Haven in 1988, the Port Marine Safety Code (PMSC) was introduced in the UK requiring all ports to carry out risk assessment of marine operations upon which the safety management system should be implemented. Deadline for implementation of the PMSC is the end of 2001. Considering that ports are at the onset of safety regime utilized in other industries (e.g. Safety Report / Case regime), a suitable risk assessment methodology has been proposed which can easily be understood by all stakeholders in a port, [1].

This methodology has been inspired by increasingly obvious shortcomings in existing safety technology, which are demonstrated in lack of information transfer from hazard identification and risk assessment through to the safety management system. This means that a link between the technical system description (risk model) and the demonstration of working of the management system in the context of major hazards control is usually missing. This is not unusual because the methodologies for hazard analysis and risk assessment, in general, do not deal with complex technical and organizational systems in a unified manner. For example, the quantitative risk assessment (QRA) may take into account operator error in the causation part of the analysis, while it is rare to account for human factors in the escalation part, unless a specific operator action is intended to be a safety barrier. Even then, the quality of organization and management is not accounted for in the QRA; for example, to incorporate the "probability of partial malfunction of the emergency system" is hardly ever done.

Objective. In the proposed methodology, it is possible to include competency, personnel training, establishing operational constraints, supervision, communication and information exchange, etc. into the risk model. In this approach, the causation part of the incident is described by one or several incident causes, triggers or threats, and the barriers that are in place or could be put in place, to prevent the realization of hazard or decrease its likelihood. If barrier failure modes can be identified, then additional "secondary" barriers can be inserted to prevent these failures. If all barriers are breached and the incident is on the escalation path to different consequences, then recovery measures are put in incident escalation path to prevent further escalation and/or mitigate the consequence. In parallel, the tasks that port personnel have to carry out on a day-to-day basis (communication with the shipping, VTS service, pilotage, towage, lock operations, boatmen, cargo operations, dredging, maintenance, etc.) are identified, and linked to the risk controls. This forms the basis for an **integrated** safety management system.

PROGRESS TO DATE: This methodology[2] has been applied to 12 ports in the UK, and the first iteration risk analysis has been completed for the Forth Ports and the Port of Tyne, while the work on other ports is in progress. The meeting of Harbor Masters, port management, VTS operators, pilots, tug masters and other stakeholders with the risk consultant will be held in July to address comments on this approach and the first pass risk assessment report.

[2] The methodology has also been applied to a heavy transport vessel for a Dutch company.

FUTURE PLANS

1. Maturing of methodology expected during application to other ports
2. Development of the safety management system supported by the described approach
3. Extend the application to the shipping industry
4. Monitoring the benefits of the approach in the ports where it was applied.
5. Modularising the approach so that it can easily be applicable to other ports; this means productising it and making is easily affordable to ports.
6. For benefits – see the attached paper.

PROPOSED PAPER

It is proposed to describe and comment on the following aspects of this approach:

1. Review of the methodology before application;
2. Initial hick-ups, and how was the full participation of the different stakeholder ensured;
3. How difficult was to establish the "systems" approach to marine operations, and identify the main safety critical tasks;
4. Several iterations of risk analysis and winning over the stakeholders;
5. "Final" risk model and linkage to safety tasks;
6. Development of risk acceptance criteria;
7. Initial risk assessment;
8. Problems with ranking of risk controls, and risk assessment of residual risks;
9. Real life examples and what it all means;
10. Review of the methodology after application;
11. Next step: the way towards ad "integrated" safety of navigation management system (including emergency response plan).
12. Achievements!

REFERENCES

[1] Enclosed paper